Urban Sprawl: A contributing factor to increased vehicle miles traveled and green house gas emissions

The automobile, an iconic image of American freedom and mobility transports its proud citizens from suburb to suburb. Is this freedom when we are stuck behind the wheel, inhaling polluted air and witnessing sprawl being built on our way to work? “The U.S. is home to the most sprawled urban areas on the globe” (Gonzalez, 2005, p. 345). Urban sprawl is defined as “new development on the fringes of existing urban and suburban areas”, characterized by low-density neighborhoods and a strong reliance on automobiles (Cafaro, 2009, p. 293). Brian Stone Jr. also describes suburbs as comprised of four distinct parts: “low density development, segregation of distinct land use types, growth in the absence of definable centers, and a lack of physical connectivity between new areas of growth” (2006, p. 690). Since the late 19th century, “the landscape in the United States has come under considerable alteration through the rapid expansion of housing developments,” paved roads and vehicle ownership (Dolney, 2009, p. 52). As urban boundaries grow and suburban sprawl increases, water and air pollution become a concern, as demonstrated by Cafaro, “sprawl development destroys 2.2 million acres of wild and agricultural lands each year; over 1300 plant and animals species remain on the endangered species list; and U.S. carbon emission continue to rise” (2009, p. 293). The implications of urban sprawl auto-reliant America are questioned.

The trolley became the catalyst of urban sprawl in the late 19th century, popular in large cities such as Chicago, New York and Los Angeles (Gonzales, 2005, p. 346). The trolley allowed city dwellers to reach places outside of the city center, which were virtually inaccessible by foot. Cities expanded and thus began what Hudnut calls “the disintegration and fragmentation” of the traditional densely packed city (2008, p. 17). As developments grew further and further from trolley lines, cars became the new mode of transportation. Urban sprawl exploded in Los Angeles with “two automobiles for every five residents” by the end of the 1920s, more than any other city in the country (Gonzales, 2006, p. 519). The Los Angeles region is still characterized by miles of low-density housing, auto reliance and severe traffic congestion.

The suburban housing boom continued with the return of WWII veterans. Timber and petroleum prices were relatively low which contributed to the affordability of suburban living (Gonzales, 2006, p. 518). To support economic expansion, the Federal Housing Administration (FHA) guaranteed “80% of home mortgages” resulting in the FHA playing a key role in the “suburbanization of the United States” (Gonzales, 2006, p. 521). During this time, highway legislation acts allowed construction of over 42,000 miles of interstate (Hudnut, 2008, p. 24). As developments moved further away from a city’s core, roads followed. Hudnut shows how today’s network of suburbs were formed by “shopping centers (that) developed around freeway interchanges…and formed the nuclei of new business centers” (2008, p. 17). He also describes the landscape of America’s contemporary cities that are “urban constellations characterized by many different commercial centers, of varying sizes, each of which is surrounded by residential neighborhoods,” confirming that vehicular transportation is the only way to navigate throughout these disconnected constellations (2008, p. 17). Urban sprawl and decentralization have become such a
problem that places are forming in between the two extremes of rural and suburban in what Hudnut calls “exurbs” (2008, p. 33).

In many areas nationwide, sprawl begins with one or two large developments in “prime farm land” lacking public transit and far from the city center (Donley 2009, p. 52). These newly developed neighborhoods contain a plethora of winding, curved roads and cul-de-sacs that are quaint and traffic-free but as “political pressure mounts to provide residents...with better access to their homes or business,” new roads are built and the suburban population increases (Maya, 2008, p. 2). Once the new development becomes overly congested, another development and additional roads arise further out of town to escape the congestion and overworked commuter roads (Duany et al., 2000, p. 87). The domino effect begins.

Suburbia, where Philip Landgdon is quoted in Suburban Nation, “people persist in building wasteful, inadequate communities then compensate for the communities’ failings by buying private vehicles and driving all over the metropolitan area in search of what ought to be available close to home” (Duany et al., 2000, p. 115). Energy and fossil fuels are finite. The environment cannot afford to be bullied by excessive automobile. Calthorpe demonstrates that suburbs “isolate people and activities in an inefficient network of congestion and pollution” (1993, p. 16). Due to the increasing abundance of roads, vehicle use and oil dependence caused by sprawl, CO₂ levels are skyrocketing and posing a threat to the environment and global climate change.

Suburban America relies heavily on cars for their transport, and this is strongly coupled with a reliance on petroleum. Historical evidence of oil dependence beginning in the mid-20th century is confirmed by Gonzalez, “between 1946 and 1953...U.S. gasoline usage went from 30 million gallons annually to 49 billion” (2006, p. 523). Rather than curb urban sprawl during the oil crisis of the 1970s, the U.S. responded with military and diplomatic force “to ensure the ample flow of petroleum” (Gonzalez, 2006, p. 516). Despite the oil crisis, automobile drivers consumed 7.1 million barrels of petroleum per day in 1970. Suburban sprawl patterns continued and in 2001, oil consumption increased to 10.1 million barrels per day (Gonzalez, 2006, p. 525). Americans are spending so much time on the road and in their cars that “each year, traffic congestion wastes more than 2 million gallons of fuel” (Hudnut, 2008, p. 75). Additionally, Calthorpe notes that America’s transportation industry “burns up 69% of the nation’s oil” (1993, p. 20).

This kind of oil consumption is not without implications. In a 2008 study of transportation and the prevention of urban sprawl, Michael Maya states that, “the most egregious costs of sprawl include...severe air and water pollution and the loss of open green spaces” (2008, p. 2). The most pressing effect of sprawl is pollution due to vehicular emissions. The transportation sector is “showing the steepest increase in greenhouse gas emissions” as vehicles paint the landscapes, parking lots and garages of suburbia (Naess, 2006, p. 3) These emissions contribute to fossil fuel depletion and increased CO₂ levels that play a role in climate change (Hudnut, 2008, p. 129). Carbon monoxide (CO₂) is a greenhouse gas that depletes the ozone layer, causing the sun’s rays to overheat the earth and result in disastrous climate phenomenon. The majority of “green house gases are generated
Sprawl has resulted in the U.S. being the “highest global absolute and per capita emitter of...carbon dioxide,” with the transportation sector accounting for one third of all emissions (Gonzalez, 2006, p. 526). Calthorpe relates air quality to driving when he says that “air quality is directly related to the number of times a car is started,” and with 12 trips a day per each household, this is a significant number (1993, p. 47). Calculations from Naess indicate that cars emit 133 kilometers of CO₂ per person compared to 67 kilometers for a bus (2006, p. 236). Each year we emit 7 billion tons of carbon with 14 billion tons estimated by 2050 (Hudnut, 2008, p. 130). Even the manufacturing and disposal of vehicles emit CO₂. From its birth to its death, a car emits a total of 66 tons of carbon dioxide, creating serious problems for the ozone (Kay, 1997, p. 93).

A 13-year study completed in 2006 from the College of Architecture at Georgia Institute of Technology found that in the U.S., “the most sprawling cities...experienced over 60% more high ozone days than the most compact cities” (Stone, 2006, p. 689). This study also supported that “lower density patterns of development are associated with a greater magnitude of vehicle emissions” (Stone, 2006, p. 689). Several sprawling cities include Los Angeles, Dallas/Fort Worth, Cincinnati and Atlanta. Atlanta is “one of the nation’s worst violators of...ground-level ozone, with most...caused by motor vehicle emissions” (Duany, 2000, p. 89). Notorious and daunting is the smog that surrounds cities such as Los Angeles and Denver. Regional alerts are given for “high smog” days but suburbanites continue to drive.

The home and car are interdependent in suburbia—Americans own 604 automobiles per 1,000 people (Gonzalez, 2006, p. 527). Walking or biking are simply not options due to safety, lack of direct access and geographic separation. Low-density developments and dispersed neighborhoods that “do not support public transportation” cause the suburbanite of any age to be automobile reliant (Maya, 2008, p. 2). Excluding the children, poor and elderly, owning a car is the only mode of transportation. Since grocery stores, offices and elementary schools are not easily accessible by foot in suburbia, “residents of sprawling areas drive greater distances ” than their more densely packed city counterparts found Maya (2008, p. 3). Increased driving results in greater vehicular pollution and greenhouse gas (GHG) emissions.

The preceding effects of sprawl are what caused vehicle miles traveled (VMT) to “increase three times faster than the population growth for four decades,” with each household averaging over 30,000 miles per year (Calthorpe, 1993, p. 20). In a study done by the U.S. Department of Transportation, between the years of 1960 and 2000, interstate route miles increase 344%, commuting by car 172%, VMT 282%, whereas the population increased by only 36% (Hudnut, 2008, p. 62). Calthorpe states several reasons for this; traditional America had narrower roads, parking at the rear of buildings and limited car access (1993, p. 17). Due to sprawling communities, an average suburban home has 2.3 cars and make 13 trips per day (Calthorpe, 1993, p. 20). Over 40% of these daily trips are between suburbs because of a shift of downtown offices to suburbia (Calthorpe, 1993, p.
19). One would suspect the work commute to comprise the majority of trips but up to “75% of trips are non-job related” and comprise of errands, social activities and daily consumption needs (1993, p. 101).

Studies in several worldwide cities “have shown that those living in the outer parts travel considerably longer by motorized means of transportation” (Naess, 2006, p. 31). Naess also found with his study of Copenhagen suburbs traffic patterns that the “highest amount of car travel” occurred from those living the furthest away from downtown Copenhagen (30-40 km) (2006, p. 50). These people also owned at least one car. Another study done in 2000 of Geauga County, Ohio found that residents with the greatest travel distance generate the greatest amount of emissions (Donley, 2009, p. 65). Longer travel distance equates to more emissions and a more harmful effect on the environment.

The nation’s population in 2008 was over 310 million, half of who lived in suburbs, (Hudnut, 2008, p. 1). Sprawl and congestion are exacerbated by lack of regional and state planning. In addition to 50 states, our nation is home to over 3,000 counties and 35,000 other local governments (Hudnut, 2008, p. 17). Each local jurisdiction has their own set of city planning laws. The division between jurisdictions and lack of statewide coordination makes the prevention of sprawl problematic (Maya, 2008, p. 2). If a city implements strict sprawl guidelines but its neighbor with no such laws “may have greater incentives to permit sprawling development” (Maya, 2008, p. 2). The states of Oregon, Florida and Washington have regional laws aimed at curbing urban sprawl but even so, “these jurisdictions do not do enough to enforce the antisprawl policies chosen by their voters and legislators” (Maya, 2008, p. 1).

The U.S. government is exacerbating green house gas emissions by granting funding for roads and highways, low gasoline taxes and a policy that Hudnut describes as “awarding transportation funding to states according to increases in VMT” (2008, p. 43). State regulations of air pollutions are poorly enforced. Hudnut also argues that government buildings provide free parking for employees but no transit subsidies, which only encourages people to drive (2008, p. 90). Cafaro lists further causes of sprawl due to government decisions; “transportation policies that favor building roads over mass transit...developments far out into the country...and tax policies that allow buildings to pass many of the costs of new development on to current taxpayers” (2009, p. 293). Additional policies create sprawl at a local level as shown by Hudnut, “local zoning codes require low-density, single-use development,” as well as “supporting development spending at the suburban fringe” (2008, p. 141).

Frustration with lack of public transportation and reliance on the car in the United States is demonstrated in my personal account. During the summer of 2009, I lived in downtown Grenoble, France, a metropolitan city about the size of Portland, Oregon. Three different tram lines (A, B, C) ran throughout the city, with buses where the tramlines did not reach. Le tram came every five to 30 minutes, depending on the location. My host mother lived in an apartment 5 minutes walking distance from three different public transportation stops enabling me to use le tram several times a day to attend class, meet friends and run errands. Walking and the comprehensive public transit system easily met all of my needs.
Both modes of transportation were efficient, convenient and safe. After returning to Eugene, Oregon, I was completely frustrated and angry about having to rely on my car to even run the simplest of errands. Biking was an option in some instances but very unsafe, as the collector road near my home is one of the busiest in Eugene. I had to walk over a mile to reach a bus line, which took over twice the amount of time to get to my destination as a car. Le tram was nowhere in sight.

Despite the compounding facts linking urban sprawl and green house gas emissions, counterarguments exist that question the legitimacy of studies claiming that urban sprawl is leading cause of air pollution. Some believe that many studies do not account for “income levels, household structure, age and leisure interests,” (Naess, 2006, p. 31). There is also the possibility that the wrong factors are to blame as Naess states in his book *Urban Structure Matters*, “there is a risk that differences in transportation patterns actually caused by such factors are being explained by differences in location” (2006, p. 31). An even more radical approach is given by Randal O’Toole in *The Vanishing Automobile* that sprawl is the solution to congestion and that high-density growth creates even more pollution, less diversity and increased use of pavement (2001, p. 17). O’Toole says that suburbs are more efficient because they “tend to have larger blocks, (and) they devote a smaller portion of their areas to pavement” (2001, p. 83). He claims Suburbia and the automobile have the most beneficial progressions in America because workers no longer live by factories, medical care is minutes away and shopping centers provide a diverse amount of goods and services at reasonable prices (O’Toole, 2001, p. 85). The suburbs simply “reflect people’s preferences for the increased mobility provided by the automobile,” as well as their preference for low-density housing (2001, p. 107). O’Toole even argues that those who drive to work, school and shopping centers enjoy their commute (2001, p. 107). He also contends that public transportation is not a solution to traffic congestion, as exemplified by Portland, Oregon’s light rail that “carries just .3 percent of all traffic in Portland” (2001, p. 102).

Another counterclaim against the negative effects of sprawl is that “exposure levels (and the health risks) are lower with sprawl” because they are not densely packed into areas without fresh air (Marshall et al., 2005, p. 284). Additionally, higher density areas result in more stop and go traffic, which requires the car to use more gasoline (O’Toole, 2001, p. 272). An additional counterargument is brought on by Maya who argues that local governments want to “avoid building costly transportation infrastructure outside the downtown core” and question the ability of high-density areas to curb vehicular emissions (Maya, 2008, p. 5).

The solutions I propose to decrease green house gas emissions in the suburbs include densely-packed mixed-use developments, more walkable and bike-friendly neighborhoods and “transportation planning laws that discourage uncoordinated and unnecessary road building” (Maya, 2008, p. 13). A 2007 study by the Urban Land Institute estimates that high-density growth “would save 85 million metric tons of carbon-dioxide emissions annually by 2030,” a huge step in combating climate change (Staff, 2007, p. 1). Hudnut says that “city dwellers simply produce less carbon than suburbanites” because of access to mass transit, walking and lower vehicle miles traveled (2008, p. 134).
Starting with the trolley of the 1890’s and ending with the gas-guzzlers of modern day, densely packed traditional cities have sprawled into constellations of development. Urban sprawl characterizes much of the United States, with infinite paved roads, outrageous numbers of miles traveled per year and unimaginable traffic congestion. America’s reliance on the automobile for the main mode of suburban transport has increased greenhouse gas emissions and put the environment at risk. The government is only exacerbating the situation by funding new roads and more suburban developments. Creating memorable places and mixed spaces that allow residents to accomplish more with less driving and more walking provide a hopeful future.
References


